NTS SWEIS – Concept and Baseline Data Reference Sheet for Solar Power Plant

Within the new NTS SWEIS, NNSA will evaluate the potential environmental effects of a large-scale solar power generating facility. While the NNSA is not proposing a plant specific design, or soliciting proposals for such a design at this time, construction of such a facility is viewed as a reasonably foreseeable action. In order to support an NNSA decision regarding designating land use zones on the NTS for alternative energy development, NNSA will evaluate the construction and operation of a "representative" plant using current technologies. More detailed NEPA analysis may be conducted at a future time should a private applicant propose a specific design for siting on the NTS.

The net generating capacity of this power generation facility would vary among the three alternatives in the SWEIS as follows:

No Action Alternative:	240 MW
Expanded Operations Alternative:	1000 MW
Reduced Operations Alternative:	100 MW

The representative design to be evaluated in the SWEIS would be based on a proposal currently being evaluated by the Bureau of Land Management (BLM) at a site near the NTS (the Amargosa Farm Road Solar Energy Project EIS), using the "dry technology" alternative. The major components of this project would be similar in size and function for all three alternatives, with the exception of the parabolic mirror array fields (discussed below), which would be scaled in size according to power generation needs.

The full text of the BLM Draft EIS can be found at:

http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/energy/proposed_solar_millenium.html

Technology and Design Description

The proposed Project includes the construction and operation of a dry-cooled solar power plant equipped with thermal energy storage capability and associated ancillary linear facilities. The electric output of the plant will be provided entirely by solar energy. No electricity will be generated by the use of fossil fuel. A dry-cooled plant provides about 5 percent less electric energy on an annual basis than a wet-cooled plant, because of reduced performance on hot summer days. The electricity cost for a dry-cooled plant is approximately 6 to 9 percent higher than for a wet-cooled plant.

Facilities located within the project area would include solar fields, power blocks, an office and maintenance building, parking area, lay-down area, switchyard, a stormwater detention basin(s), and an area designated for bioremediation of any soil contaminated by heat transfer fluid (HTF), petroleum, or other process chemicals. The majority (approximately 90 percent) of the plant footprint is taken by the solar field.

The proposed Project would utilize parabolic trough solar thermal technology to produce electrical power using steam turbine generators fed by solar steam generators. The main element of a parabolic

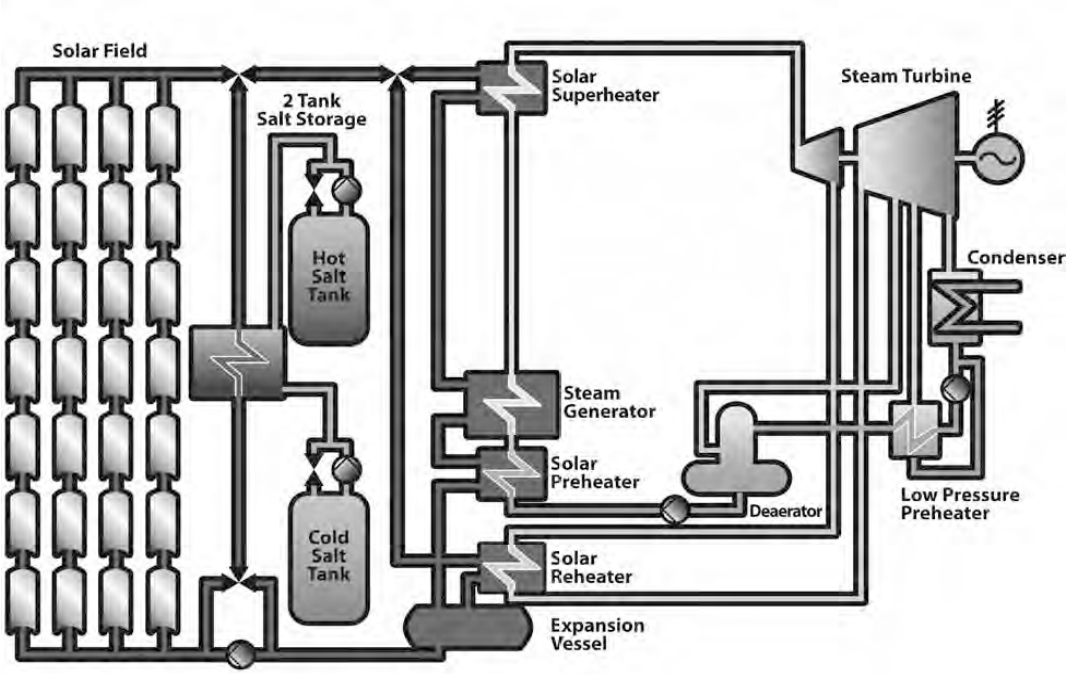
trough power plant is the solar field. The solar field consists of numerous parallel rows of solar collectors, arranged on a north-south axis. The solar collectors follow the path of the sun from east to west during the day to keep the sun's rays continuously focused on a receiver tube.

The reflectors consist of parabolic mirrors made from transparent, silver-coated glass, which concentrate the incident solar radiation 80-fold, focusing it onto the receiver tube in the solar collector. The receiver tube contains anHTF in a closed circuit that can be heated to temperatures of up to 752 degrees Fahrenheit (°F) (400 degrees Celsius [°C]). Once heated, the HTF is pumped to a centrally located power block, where it flows through a heat exchanger. The HTF is a synthetic hydrocarbon liquid mixture of diphenyl ether and biphenyl oxide. The HTF is not classified as a DOT hazardous material or regulated under CERCLA regulations.

The remainder of the process is similar to the steam cycle used in conventional power plants. The steam produced by the heat exchanger drives a turbine connected to a generator, which produces electricity to be fed into a substation. With solar thermal technology, the heat is stored (referred to as thermal storage) and used during periods of cloud cover and up to 4.5 hours after sundown.

During periods when the solar power generating facility is shutdown, the HTF is circulated through the piping in the solar fields at low flow rate. On colder winter nights, supplemental heat will be required to ensure the HTF doesn't freeze in the piping. A propane-fired HTF heater, with a rated capacity of 35 million British thermal units per hour (MMBtu/hr), would be provided as part of the HTF system. The HTF heater will need to operate approximately 50 hours per year to keep the HTF from freezing.

Simplified Schematic of Solar Power Generating Assembly[a]



[a] Source: EIS for the Amargosa Farm Road Solar Project (BLM 2010)

Project Attributes Scaled by Alternative

The baseline attributes of the project, by alternative, are presented below. Note that these attributes are rough estimates, scaled in magnitude from those analyzed under the BLM EIS, which assumed a 464 MW total generating capacity using two parallel generating systems.

	No Action	Expanded Ops	Reduced Ops
Net Generating Capacity	240 MW	1,000 MW	100 MW
Land Use, Geology			
Area of Disturbance (acres)	Solar Fields: 2,000 Power Blocks: 28 Admin & Support Facilities: 5 Stormwater Ponds: 15 Bioremediation Area: 5 Misc (15%): 308 **Total: 2,361 acres**	Solar Fields: 8,000 Power Blocks: 110 Admin & Support Facilities: 8 Stormwater Ponds: 20 Bioremediation Area: 7 Misc (15%): 1,222 **Total: 9,378 acres**	Solar Fields: 1,000 Power Blocks: 25 Admin & Support Facilities: 4 Stormwater Ponds: 12 Bioremediation Area: 4 Misc (15%): 157 **Total: 1,202 acres**
Size of Solar Land Use Zone sited in (in Area 25, acres)	2,400 acres	39,600 acres	2,400 acres
Socioeconomics			
Construction Employment	Average of 500 FTEs over 35 months, peak of 1,000 FTEs.	Average of 750 FTEs over 42 months, peak of 1,500 FTEs.	Average of 400 FTEs over 32 months, peak of 800 FTEs.
Permanent Employment	150 FTEs	200 FTEs	125 FTEs
Water Use			
Water Use, construction (acre-feet per year)	350	1,000	200
Water Use, operations (acre-feet per year)	250	700	175
Air Quality			

	No Action	Expanded Ops	Reduced Ops
Construction – Mass Emission Estimates (tons per year, all sources)	NOx: 75 VOC: 11 CO: 85 SO2: 0.2 PM10: 30 PM2.5: 8	NOx: 225 VOC: 35 CO: 255 SO2: 0.6 PM10: 90 PM2.5: 24	NOx: 50 VOC: 7 CO: 55 SO2: 0.1 PM10: 20 PM2.5: 6
Operations – Emission sources	- One 35-MMBtu/hr LPG-fired auxiliary boiler for start up (19% capacity factor) - One 35-MMBtu/hr LPG-fired HTF freeze protection heater (6% capacity factor) - One 300-Hp diesel-fired emergency fire water pump (NTE 50 hrs/yr testing) - One 300-Hp diesel-fired emergency generator engine (NTE 50 hrs/yr testing) - One two-cell wet-cooling tower (3,700 hrs/yr operation) - One HTF expansion/ullage system (assume NTE 0.75 lbs VOC/hr for 400 hrs/yr) Bioremediation cell emissions (assume NTE 1,000 lb/yr VOCs) - Maintenance vehicles	Two 35-MMBtu/hr LPG-fired auxiliary boilers for start up (19% capacity factor) - Two 35-MMBtu/hr LPG-fired HTF freeze protection heater (6% capacity factor) - Two 300-Hp diesel-fired emergency fire water pumps (NTE 50 hrs/yr testing each) - Two 300-Hp diesel-fired emergency generator engines (NTE 50 hrs/yr testing each) - Two two-cell wet-cooling tower (3,700 hrs/yr operation each) - Two HTF expansion/ullage systems (assume NTE 0.75 lbs VOC/hr for 400 hrs/yr each) Bioremediation cell emissions (assume NTE 1,600 lb/yr VOCs) - Maintenance vehicles	One 35-MMBtu/hr LPG-fired auxiliary boiler for start up (19% capacity factor) - One 35-MMBtu/hr LPG-fired HTF freeze protection heater (6% capacity factor) - One 300-Hp diesel-fired emergency fire water pump (NTE 50 hrs/yr testing) - One 300-Hp diesel-fired emergency generator engine (NTE 50 hrs/yr testing) - One two-cell wet-cooling tower (3,700 hrs/yr operation) - One HTF expansion/ullage system (assume NTE 0.75 lbs VOC/hr for 400 hrs/yr) Bioremediation cell emissions (assume NTE 800 lb/yr VOCs) - Maintenance vehicles